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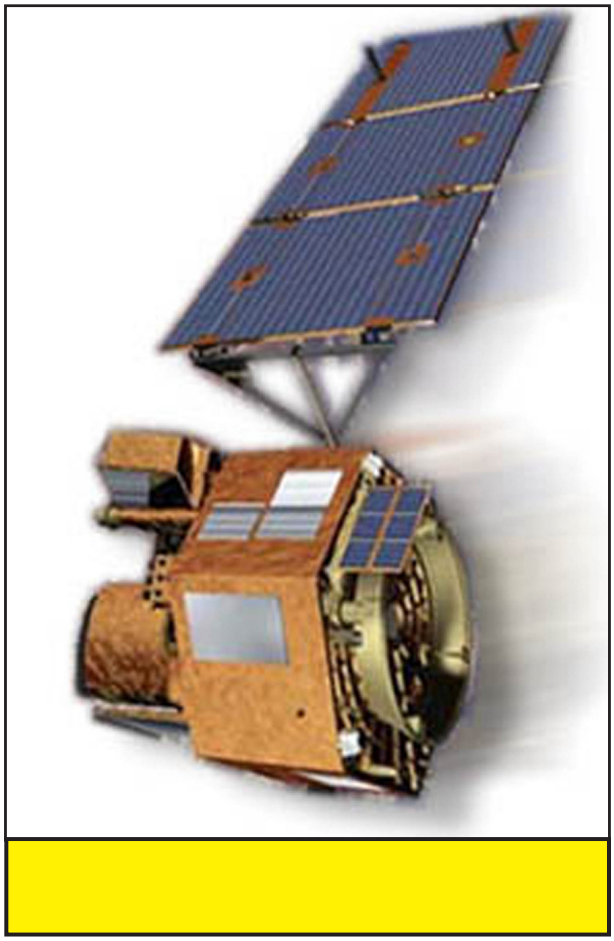
Success Story

GOVERNMENT AND INDUSTRY TEAM CREATES LIGHTWEIGHT, HIGHLY CONDUCTIVE SPACE RADIATOR PANEL



Carbon-carbon has the widest range of tailorable thermal conductivity and stiffness among the elements. It has a low density and, in some circumstances, is two to three times lighter in weight than aluminum. High conductivity carbon-carbon facesheets enable radiator panels to dissipate more heat, thereby reducing, and possibly eliminating, the number of required heat pipes. Based on the success of in-flight tests, the panel may change the way spacecraft builders and integrators view carbon-carbon.

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Accomplishment

A partnership between government and industry yielded a revolutionary carbon-carbon space radiator panel that could increase the service life of satellites, while reducing the cost of putting them in orbit. Partners included AFRL's Materials and Manufacturing and Space Vehicles Directorates, the Navy, the National Aeronautics and Space Administration (NASA), and Lockheed Martin. NASA launched the earth observing (EO-1) satellite, installed with the radiator panel from Vandenberg AFB, California. The satellite is the first of three new millennium program earth-orbiting missions that demonstrates new instruments and spacecraft systems.

Background

Researchers know future spacecraft will require smaller and more closely packed electronic components, and lightweight radiator panels that conduct more thermal heat. In response to future requirements, researchers from the Materials and Manufacturing Directorate's Nonmetallic Materials Division and NASA created the carbon-carbon space radiator partnership. Satellites in orbit carry electronic components that generate heat while performing their jobs and absorbing radiation. Radiator panels, which are a structural element of the satellite, prevent damage to heat-sensitive components by conducting and radiating heat away from them.

In the past, researchers used aluminum in satellite radiator panels because of its conductivity, and structural and physical properties. In order for aluminum panels to work, they must be thicker near high heat load zones. However, lighter weight and superior performing material alternatives exist, such as carbon-carbon.

Materials and Manufacturing
Emerging Technologies

Additional information

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